

Wi-Fi CERTIFIED™ Makes it Wi-Fi

Wi-Fi CERTIFIED™ n: What Retailers Need to Know

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What is Wi-Fi CERTIFIED n?



- Wi-Fi CERTIFIED is the industry's independent seal of approval for all types of Wi-Fi products. It helps ensure the best user experience, so it reduces product returns.
- **Wi-Fi CERTIFIED n** is the testing and certification program from the Wi-Fi Alliance® that corresponds with new 802.11n wireless standards.
- Wi-Fi CERTIFIED n products deliver the very best connection available for computer networking and home entertainment applications.
- Wi-Fi CERTIFIED n products deliver interoperability across vendors, the very latest security protections, and mechanisms to make sure multimedia applications look, sound, and play the way they should.
- Wi-Fi CERTIFIED n is high-performance Wi-Fi. It leverages signal echoes and multiple antennas to vastly improve throughput, range, and reliability compared to older versions of Wi-Fi.



Do consumers have to upgrade their entire network if they purchase a new Wi-Fi CERTIFIED n product?



- Although Wi-Fi CERTIFIED n is the very latest in Wi-Fi technology, it will work with 802.11a/b/g products consumers already own
- Users won't get all of the performance benefits of Wi-Fi CERTIFIED n when using it with older Wi-Fi products
- Consumers should use the Wi-Fi CERTIFIED logo on the product or packaging to determine which earlier Wi-Fi products are compatible with a product

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Backward compatible with a/b/g products



What happens to products that were Wi-Fi CERTIFIED 802.11n draft 2.0?



- Over the past two years, more than 700 products were designated Wi-Fi CERTIFIED 802.11n draft 2.0, meaning they were tested to an earlier draft of the 11n standard
- These products will interoperate with the new Wi-Fi CERTIFIED n products in the same frequency band
- These products still meet baseline requirements for Wi-Fi CERTIFIED n, so can now use the updated logo

Logo previously used to indicate products tested to a preliminary standard of 802.11n



Updated Wi-Fi CERTIFIED n logo

What does the new Wi-Fi CERTIFIED n logo mean?



- The Wi-Fi CERTIFIED n logo is the consumer's best assurance of an interoperable, backward compatible product with security protections in place.
- The letter n after Wi-Fi in the logo indicates that a product has been tested to the latest 802.11n standards
- The letters to the left of Wi-Fi in the logo indicate which prior versions of Wi-Fi products are compatible




Logo variations indicate compatibility with 802.11 a/b/g products

How can I help a consumer find the right product for their needs? Check the matrix label.



- Products may include a matrix on the packaging that indicates both the frequency band (2.4 GHz or 5GHz) and the number of transmit and receive streams that a product contains.
- Consumers should make sure that the products they are trying to connect on a network all operate on the same frequency band.
- Typically, the more streams (like highway lanes) a network contains, the more traffic it can handle.
- For activities like sharing photos, email and web surfing, or running home finance update applications, networking products with fewer streams may be sufficient
- If multiple users in a household want to access the network at the same time of day, or if more intensive use (gaming, video, etc.) is planned, a user should consider purchasing a product with more streams





Tested Spatial Streams	Dual-Band Selectable	
	2.4GHz	5GHz
Transmit	3	3
Receive	3	3

www.11nbasics.org

How can I help a consumer find the right product for their needs? Look for logo and tagline.



- Products may include a tagline on the packaging as shown below, to indicate that a product includes certain optional 11n features

Client capabilities requirements	Access point capability requirements	Logo with tagline (sample)	Performance vs. legacy Wi-Fi (802.11 a/b/g)
<ul style="list-style-type: none"> • Two streams • Packet aggregation • 40 MHz operation if 5GHz is supported 	<ul style="list-style-type: none"> • Two streams • Packet aggregation • 40 MHz operation if 5GHz is supported • STBC 	 <p>dual-stream n</p>	Up to 5x throughput and enhanced range vs. legacy
<ul style="list-style-type: none"> • Three + streams • Packet aggregation • 40 MHz operation if 5GHz is supported 	<ul style="list-style-type: none"> • Three + streams • Packet aggregation • 40 MHz operation if 5GHz is supported • STBC 	 <p>multi-stream n</p>	Up to 10x throughput and enhanced range vs. legacy

Actual performance of Wi-Fi networks varies based upon a variety of factors including the properties of the networking device, physical environment, and properties of client devices on the network.

Summary



- Wi-Fi CERTIFIED n is high performance Wi-Fi that has passed rigorous independent tests for interoperability, security, and multimedia
- Always recommend Wi-Fi CERTIFIED products to reduce product returns and support calls.
- The Wi-Fi CERTIFIED n logo helps identify products that interoperate with older versions of Wi-Fi – 802.11 a/b/g. Users should always match the logo to the type of older Wi-Fi products they already own.
- For more detailed indications of a product's feature profile, look for the Wi-Fi CERTIFIED n taglines (dual-stream and multi-stream n) or the matrix style label
- Products with more streams or special tagline designations tend to offer higher performance, but may not be necessary for all users

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Where can I find more information?



- White papers, presentations, mini video tutorials and a list of Wi-Fi CERTIFIED n products are available at www.11nbasics.org.

The screenshot shows the Wi-Fi Alliance website homepage. At the top, there is a navigation menu with links for 'About', 'Certification', 'Enterprise', 'Operators', 'Media', and 'Knowledge Center'. A search bar with a 'GO' button is also present. Below the navigation, the Wi-Fi Alliance logo is displayed on the left, and the tagline 'Wi-Fi CERTIFIED™ makes it Wi-Fi.' is centered. A large banner features a woman wearing headphones and holding a pink phone, with the text 'I connect with my community.' in English, 'Me conecto con mi comunidad.' in Spanish, and '我连接用我的社区' in Chinese. To the left of the banner are four buttons: 'Discover and Learn', 'Wi-Fi CERTIFIED™ Products', 'Hotspot Finder', and 'Wi-Fi in Your Life'. Below the banner, there are three promotional boxes: 'Wi-Fi CERTIFIED Gift Guide for Back to School' with a 'LEARN MORE' link, 'Follow us on Twitter' with a 'LEARN MORE' link, and 'Find products Wi-Fi CERTIFIED for Wi-Fi Protected Setup' with a 'LEARN MORE' link. At the bottom, there is a 'Recent News' section with a 'All News' link.



Wi-Fi CERTIFIED n: Glossary of Basic Terms

Glossary of Wi-Fi CERTIFIED n terms



- **40 MHz operation:** A mode of Wi-Fi operation in which two “channels” or paths on which data can travel are combined to increase performance in some environments. Because this technique requires more spectrum resources, it can create problems for neighboring Wi-Fi networks in the 2.4 GHz band, so Wi-Fi CERTIFIED products must have the feature disabled by default in 2.4, and must employ coexistence mechanisms to help ensure that the device is a good neighbor. Wi-Fi CERTIFIED devices can operate in 40MHz in the 5GHz band without restriction. Devices that support 40 MHz operation may list the feature as 20/40 or 40MHz operation.
- **Data rate:** Also known as the “PHY” rate, this number captures the speed at which all data bits pass over the Wi-Fi network. Many Wi-Fi utilities will report this number as the “speed” at which your network is performing. Actual **throughput** rates will be lower than the data rate due to available network capacity and overhead in real-world environments . Wi-Fi CERTIFIED n data rates can exceed 5x those of legacy Wi-Fi technologies like 802.11 a/b/g.

Glossary of Wi-Fi CERTIFIED n terms



- **Frequency band:** Wi-Fi 802.11n operates at two frequencies: 5GHz and 2.4GHz. Only devices which operate in the same frequency band can communicate with one another. Many 802.11n devices support only one frequency band, while others can operate in both. Of those devices which operate in both frequency bands, some are dual-band. Dual-band APs can be **switchable** (meaning the user must choose one of the two bands for operation), while others support **concurrent** operation (can transmit on both 5GHz and 2.4GHz). Devices with concurrent operation capabilities have twice the capacity of single-band or switchable devices and maintain simultaneous connectivity to both 2.4GHz and 5GHz devices. This benefit is only realized when you have a mix of 2.4 and 5Ghz client devices.
- **Greenfield Preamble:** A preamble is a technique to enable devices to recognize one another. This feature leads to improvements in efficiency and power consumption, in networks in which there are only devices which support this feature. Legacy devices cannot interpret greenfield preamble, so it is not recommended in mixed networks.
- **HT Duplicate Mode:** In this mode, the same packet is sent twice (each on a 20MHz channel in 40MHz mode), leading to a more robust transmission. This feature can be particularly beneficial at the edge of the Wi-Fi network's coverage footprint.

Glossary of Wi-Fi CERTIFIED n terms



- **MIMO:** Multiple-input/multiple-output. Refers to the use of multiple radios and antennas to transmit and receive data wirelessly to increase performance. All Wi-Fi CERTIFIED n access point devices support MIMO technology.
- **Packet Aggregation:** A technique to move data much more efficiently. Multiple smaller packets which are headed to the same destination are bundled together, eliminating multiple waiting periods between those packets. This increases throughput and allows devices to “sleep” more, which in turn improves spectrum and power usage. The method of packet aggregation which is tested in Wi-Fi CERTIFIED n is A-MPDU.
- **Range:** This term is typically used to describe how far a Wi-Fi signal can travel. Wi-Fi CERTIFIED n devices typically have a range of up to 200 meters and can cover an entire home with a strong Wi-Fi signal. Another benefit of 802.11n technology is much better **coverage**. 802.11n uses “reflections” of the signal (off walls, etc.) to strengthen it and eliminate cold or weak spots in the signal.

Glossary of 802.11n terms



- **Short Guard Interval:** Guard intervals (GI) are used in all Wi-Fi technologies to ensure that distinct transmissions don't interfere with one another. The interval is a period at the end of each symbol transmitted allocated to letting the signal dissipate prior to transmitting the next signal. This prevents overlaps between two consecutive symbols. 802.11n devices can optionally shorten this period by 50% versus legacy Wi-Fi technologies in order to increase the efficiency of the communication.
- **Spatial stream:** A data transmission in a wireless network. MIMO technology makes use of multiple radios and antennas to improve performance. A spatial stream might be compared to a lane on a highway. For stationary products like PCs and access points, the number of spatial streams can improve performance. Other devices, such as handsets, printers, and other small devices, do not need spatial multiplexing techniques to perform well. End-user benefit also depends on the application's ability to take advantage of the performance boost of multiple spatial streams.

Glossary of Wi-Fi CERTIFIED n terms



- **Space Time Block Coding:** a multi-antenna communication technique in which multiple copies of the same piece of data are sent independently. The resulting redundancy improves the reliability of data transmissions, especially for single-stream devices like handsets and printers. Wi-Fi certification addresses Single Spatial Stream STBC, in which the AP uses two antennas to transmit and the client uses 1 antenna to receive. APs are tested for the 2-antenna transmission, and clients, for the 1-antenna receive.
- **Throughput:** Different from data rate, throughput measures the effectiveness of a network in transmitting user data.
- **Tx (Transmit) AMPDU:** This is a specific method for packet aggregation. All Wi-Fi CERTIFIED n devices are capable of receiving aggregated packets, and can optionally transmit aggregated packets.